CLAIMS:

1. A magnetic resonance imaging (MRI) system comprising an examination volume, a main magnet system for generating a main magnetic field in the examination volume in a Z-direction, a gradient magnet system for generating gradients of the main magnetic field, and an anti-vibration system for reducing vibrations of the gradient magnet system caused, during operation, by a mechanical load exerted on the gradient magnet system as a result of electromagnetic interaction between the main magnetic field and electrical currents in the gradient magnet system, characterized in that the anti-vibration system comprises a balance member, which is coupled to the gradient magnet system by means of an actuator system and a coupling device allowing displacements of the balance member relative to the gradient magnet system, the MRI system having a control system for controlling the actuator system in such a manner that, during operation, the actuator system exerts upon the balance member a compensating mechanical load which substantially corresponds to the mechanical load exerted on the gradient magnet system.

2. An MRI system as claimed in claim 1, characterized in that, during operation, the control system applies a control signal to the actuator system corresponding to the compensating mechanical load, the control system determining said control signal as a function of the value of the electrical currents in the gradient magnet system.

3. An MRI system as claimed in claim 2, characterized in that the gradient magnet system comprises a sensor system which, during operation, measures residual vibrations of the gradient magnet system and which applies a measuring signal to the control system corresponding to the measured residual vibrations, the control system adjusting the control signal in such a manner that the measured residual vibrations are smaller than a predetermined threshold value.

4. An MRI system as claimed in claim 1, characterized in that the actuator system comprises piezo-electric actuators.

5. An MRI system as claimed in claim 1, characterized in that the balance member comprises an electrically conductive portion which is positioned in a portion of the magnetic field of the main magnet system.

6. An MRI system as claimed in claim 1, characterized in that the MRI system has a first magnet unit and a second magnet unit at a distance from the first magnet unit, the examination volume being present between the first and the second magnet unit, wherein the first and the second magnet unit comprise a first portion and a second portion, respectively, of the main magnet system and a first portion and a second portion, respectively, of the gradient magnet system, and wherein the first and the second portion of the gradient magnet system are each coupled to a separate balance member by means of a separate actuator system and a separate coupling device allowing at least rotations of the respective balance member relative to the respective portion of the gradient magnet system about a first and a second axis of rotation which are mutually perpendicular and perpendicular to the Z-direction, the control system controlling each actuator system in such a manner that, during operation, each actuator system exerts upon the respective balance member at least compensating mechanical torques about the first and the second axis of rotation which substantially correspond to mechanical torques exerted on the respective portion of the gradient magnet system as a result of the electromagnetic interaction between the main magnetic field and the electrical currents in the respective portion of the gradient magnet system.

7. An MRI system as claimed in claim 6, characterized in that each actuator system comprises three actuators which each exert a compensating force on the respective balance member in a direction parallel to the Z-direction.

8. An MRI system as claimed in claim 6, characterized in that the first and the second portion of the gradient magnet system are positioned in a portion of the respective magnet unit facing the examination volume, and in that the respective balance member is positioned at a side of the respective magnet unit remote from the examination volume, the respective portion of the gradient magnet system and the respective balance member being connected to each other via a connecting member which is accommodated in a central chamber provided in the respective magnet unit and in the respective portion of the main

magnet system.

9. An MRI system as claimed in claims 4, 7 and 8, characterized in that each of the three actuators is a piezo-electric actuator arranged in the central chamber of the respective magnet unit.

10. An MRI system as claimed in claims 5 and 6, characterized in that each balance member comprises an electrically conductive portion arranged in the central chamber of the respective magnet unit.

11. An MRI system as claimed in claim 10, characterized in that the electrically conductive portion of each balance member comprises a cylindrical plate which is oriented substantially parallel to the Z-direction.

12. An MRI system as claimed in claim 11, characterized in that each balance member comprises a massive cylindrical body which is arranged in the central chamber of the respective magnet unit, the respective cylindrical plate being mounted around said body.